

# Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11.

February, 1909.

No. 122.

## NEW SPECIES OF CLADOPHORA.

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(Plate 78.)

**Cladophora microcladioides** n. sp. Frondibus plus minusve caespitosis, 10–20 cm. altis; filamentis basi circa 200  $\mu$  diam., rigidis, rectis vel flexuosis, distanter ditrichotomis, ramis similibus, erectis aut plerumque recurvatis, ramulos breviores secundatos latere superiore et interiore gerentibus; ramificatione ejusmodi iterata in ramellos ultimos paucicellulares subacutos, 80–100  $\mu$  diam., desinente; cellulis diametro 2–6-plo longioribus; membrana cellulari crassa, in cellulis adultioribus lamellosa. Ramis fere e cellulis omnibus ortis, singulis, vel ad quatuor e cellula singula.

Fronds more or less tufted, 10–20 cm. high; filaments about 200  $\mu$  diam. at the base, stiff, erect or flexuous, distantly ditrichotomous; branches similar, erect or more generally recurved, bearing shorter ramuli, secund on the upper or interior side; repeated ramification of this kind ending in few-celled subacute ultimate ramelli, 80–100  $\mu$  diam.; cells 2–6 diam. long; cell wall thick, in older cells lamellose. Branches arising from almost every cell, singly, or up to four from one cell.—Coast of California, from Monterey to San Pedro.

A stout but graceful species, with a characteristic ramification, like that of the red alga, *Microcladia borealis* Ruprecht. There is considerable variation according as the main divisions are straight or flexuous, the branches close or more distant, erect or recurved; but the peculiar symmetrical ramification will distinguish it from any other of the American species. In the most typical form, every branch is regularly recurved, and bears on its convex side a series of similar but smaller branches, which curve uniformly in the opposite direction; and in turn bear another similar series. In some plants the branching is very dense, two, three or even four branches issuing from the top

of a single cell, which may be twice as broad at the top as below; usually all but one of these branches are short and simple or nearly so; one being longer, and developing in the typical way. However many branches may issue from one cell, they are never whorled, but expand flabellately in one plane. In the writer's herbarium are specimens from Monterey, collected by Prof. G. J. Pierce, and from San Pedro, collected by Miss S. P. Monks and by Dr. N. L. Gardner; the specimens from the last are in the best condition, and should be considered the type.

**C. *Howei*** n. sp. Filamentis repentibus vel decumbentibus, caespites densos formantibus; cellulis irregularibus, circa 150  $\mu$  diam., in cellula terminali ad 75  $\mu$  attenuatis; longitudine diametron aequante vel triplo superante; filamentis erectis, basi circa 50  $\mu$  diam., ad 20–25  $\mu$  diam. in apice rotundato vel subacuto attenuatis, e filamentis basilaribus exeuntibus, cellulis basi diametro 5–6-plo prope apicem ad 15–20-plo longioribus; filamentis erectis parce ramosis, ramis erectis vel adpressis, filamentis erectis similibus.

Filaments creeping or decumbent, forming dense tufts; cells irregular, about 150  $\mu$  diam., diminishing to 75  $\mu$  in the terminal cell, one to three diam. long; vertical filaments, about 50  $\mu$  diam. at the base, diminishing to 20–25  $\mu$  at the rounded or slightly acute apex, issuing from the basal filaments; cells 5–6 diam. long at the base, 15–20 at the tip; vertical filaments sparingly branched, branches erect or appressed, similar to the vertical filaments.—Gibbet Island, Bermuda, June, 1900, collected by Dr. M. A. Howe, No. 33. Type material in the herbarium of the writer and that of the New York Botanical Garden.

Forming a dense coating in tide pools, about 1 cm. high; the base a dense mass of dark green, much branched, irregular filaments, from which arise the slender, slightly branched, long-jointed filaments, pale green under the microscope, yellow in the mass. This yellow may not be a permanent character, as the same shade appears to be produced by local conditions in some algae normally green. The contorted, densely matted basal filaments suggest the subgenus *Aegropila*, but there is no indication of a definite form to the whole mass. The sharp distinction between the delicate, erect filaments and the stout, thick-walled basal growth, reminds one of certain fresh water species of *Cladophora*, in which cells, often remaining connected in filaments, pass the winter in a thick-walled, akinete state, emitting new and quite different appearing filaments in the spring. But in *C. Howei* the stouter cells do not seem like akinetes, and appear to continue to

grow and divide, the terminal cells being considerably more slender than the others, but much larger than those of the erect filaments.

**C. graminea** n. sp. Frondibus caespites laxos formantibus, 10–15 cm. longis, cartilagineis, prasinis; filamentis primariis 300  $\mu$  diam., distanter di-trichotomis; ramis omnibus erectis, ramulis ultimis 100–150  $\mu$  diam., apicibus obtusis vel subacutis; cellulis inferioribus praelongis, ad 30-plo longioribus quam crassis; superioribus brevioribus, eis ramorum ultimorum diametro 4–6-plo solum longioribus; cellula singula normaliter spatium inter dichotomias proximas occupanti; membrana cellulari plerumque valde striata.

Fronds forming loose tufts, 10–15 cm. long, cartilaginous, dark green; main filaments 300  $\mu$  diam., distantly di-trichotomous; all divisions erect, ultimate divisions 100–150  $\mu$  diam., tips blunt or slightly acute; cells very long, up to 30 diam. below, shorter above, in the ultimate branches 4–6 diam., each cell normally occupying the space between two successive forkings; cell wall usually strongly striate.—Monterey to San Pedro, California.

Distinguished from all our other species by the long cells, each normally extending from one forking to the next; in this it agrees with *C. pellucida* (Huds.) Kütz. of Europe, but in the latter there is more reduction of size in the successive orders of branches, the main filament being sometimes as large as 500  $\mu$  diam., while the ultimate ramuli are seldom over 50  $\mu$ , and are dense and more or less fasciculate. In *C. graminea* there is comparatively little diminution in size, and the tips are loose and open. In *C. pellucida* the divisions of the di- or trichotomy are usually equal and develop equally; in *C. graminea* one is often much reduced, sometimes being only a single cell. The original specimen was sent the writer by Mrs. A. E. Bush, under the name of *C. cartilaginea* (Rupr.) Harvey, and there is a certain similarity of habit; but Ruprecht's *Conferva cartilaginea* is not a true *Cladophora*, and probably should be placed in *Spongomorpha*. Mrs. Bush's specimen, in herb. F. S. C., is the type of *C. graminea*.

**C. constricta** n. sp. Fronde dense caespitosa, ad 10 cm. alta, subfastigiata; filamentis primariis ad 65  $\mu$  diam., ramis minoribus, ramulis ultimis circa 25  $\mu$  diam.; cellulis diametro 5–20-plo longioribus, plerumque leviter clavatis, frequenter constrictionem annularem distinctam paulo super basin exhibentibus. Ramificatione plerumque opposita inferne et saepe superne, saepe etiam laterali, ramulis brevibus subsecundatis; ramis et ramulis primo subpatentibus, mox sursum curvatis; apice cellulae terminalis breviter conicali-rotundata.

Frond densely tufted, up to 10 cm. high, somewhat fastigiate; main filaments to 65  $\mu$  diam.: branches smaller, ultimate ramuli about

25  $\mu$ ; cells 5–20 diam. long, mostly somewhat clavate; often with a distinct annular constriction shortly above the lower end; branching mostly opposite below and often above, but also often lateral, the short ramuli somewhat secund; branches and ramuli at first rather patent, soon curving upward; apex of terminal cell shortly conical with rounded tip.—Montego Bay, Jamaica, June 12, 1907. Collected by Dr. M. A. Howe, in connection with the expedition of the New York Botanical Garden to Jamaica. No. 4978. Type material in herb. F. S. C. and herb. N. Y. B. G.

In general appearance this species reminds one of a small and dense form of *C. gracilis* such as is often found in shallow pools on the north Atlantic coast, but the resemblance is merely external, the branching being more like that of *C. rupestris*, from which, however, it differs much in dimensions and texture. The cells vary in length, but average quite long, and usually increase slightly in diameter from the base to the summit. In the older parts the branching is quite regularly opposite, and as the basal cells of each branch are of the same size as the cell of the main filament arising between them, the effect is that of trichotomy. In a few cases four practically similar cells have been seen arising from the same point. As a branch or a pair of branches arises from about every second cell of a filament, the frond becomes very dense, and as the development seems to go on quite uniformly throughout the frond, the outline is usually regular. The constriction does not occur on all the cells, and may be more or less prominent; often it is very distinct, the diameter of the cell being reduced at this point to less than half the normal, the interior thickening of the cell wall contributing to the reduction. This constriction is interesting as showing a possible relation to the *Valoniaceae*, in which the character is sometimes strongly developed.

MALDEN, MASSACHUSETTS.

#### EXPLANATION OF PLATE 78.

- Fig. 1, *Cladophora Howei*, portion of basal filament with erect branches.  
 Fig. 2, " *microcladioides*, portion of densely branching frond.  
 Fig. 3, " " general scheme of branching.  
 Fig. 4, " *constricta*, trichotomy in a main branch.  
 Fig. 5, " " main branch, outline only.  
 Fig. 6, " *graminea*, end of branch, outline only.